North Raleigh Model Railroad Club

Installing Decoders in N Scale Locomotives
Detailed Instructions

Con-Cor J3A 4-6-4 Hudson Steam Locomotive & Tender

by
Jim Reske & John Wallis

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Introduction

The following detailed description covers installation of a Digitrax DZ121 decoder in a Con-Cor (Kato-manufactured) Hudson (4-6-4) Steam locomotive, as actually performed by Jim Reske, a member of the North Raleigh Model Railroad Club, and reflects the experiences encountered during the installation. Other Digitrax decoders could be used as well as N scale decoders from Lenz, TCS, etc.

You should note there are at least two versions of the 4-6-4 Hudson locomotive produced by Con-Cor. The first is a Kato design and manufactured locomotive that was available up to the early 1990's. The current version of the 4-6-4 is produced in China by Con-Cor using the Kato dies, etc. The instructions provided here are for the earlier version of the locomotive; some minor differences may be encountered in converting the current version.

The most important factor to remember in performing an analog to digital conversion is to ensure both motor brushes and the decoder orange and gray wires are insulated from the frame. Any contact of the brushes and/or these wires with the frame may result in virtually instant destruction of the decoder.

The first step in the description which follows is to test the decoder for proper operation, following the instructions provided by the manufacturer. The purpose of this step is to ensure any non-operational or dead-on-arrival decoder can be repaired by the manufacturer under warranty.

As you carry out the detailed instructions below, also refer to the assembly diagram and parts list provided by Con-Cor with the locomotive. It will help in laying out the parts and understanding the terminology used.

Tools Required

To install the decoder and modify the frame you will need the following tools:

Installing the Decoder

- Small Phillips-head and flat-head screwdrivers
- Wire cutter and stripper
- Soldering iron with fine tipped point, 20 watts maximum
- Fine resin core solder
- Tweezers (hook tipped work best)
- Long-nosed pliers, small
- Paint or magic marker

Motor Conversion

- Jeweler's files
- Safety glasses
- Motor Tool with Metal cutting bits (Ball shape, cone shape, etc.)
- Wide cut-off wheel for motor tool
- 600 Grit wet and dry sandpaper

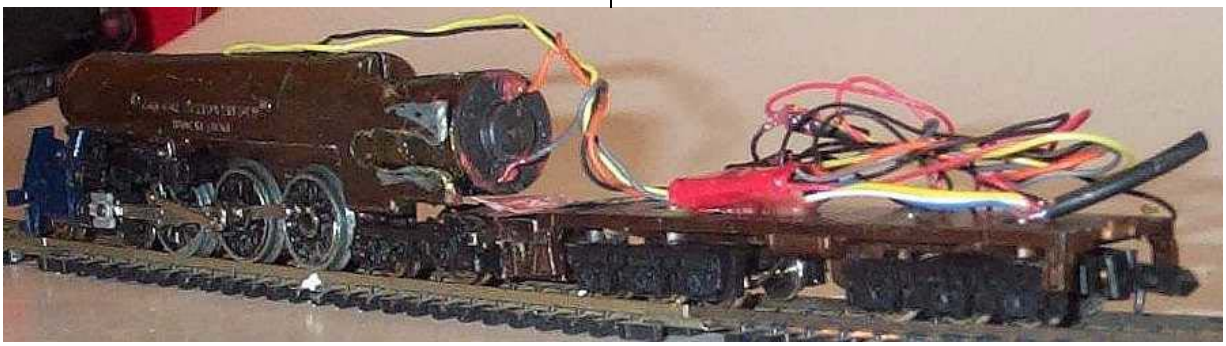
Detailed Installation Instruction
Con-Cor J3A 4-6-4 Hudson Steam Locomotive

Print out this document. As each step in the installation is completed place a "X" or a check-mark through the box. All references to the frame are based on the front being at the top or away from you.

In normal analog (DC) operation, the 4-6-4 locomotive upper frame is connected to the left rail and the lower frame is connected to the right rail. (The metal screw on the left side of the frame is the left rail, and on the right side is the right rail.) The motor top brush is the left rail connection and the bottom brush is the right rail connection.

This installation makes use of the Digitrax DZ121 decoder. This decoder will be installed in the tender of the locomotive.

Note in the following photographs that the original Kato motor has been replaced with a Sagami 1630 motor. The box below the photos describes the Sagami conversion. The detailed instructions refer to the original motor, but work for the Sagami motor.



The Sagami motor conversion uses a Sagami 1630 (16mm round and 30mm long) motor. The original motor is much slimmer and mounts on the frame projection on the left side frame. The worm gear from the old motor must be removed and mounted on the new motor. A considerable amount of the frame projection for supporting the motor must be carved away using a Dremel motor tool and a 1/8" diameter rotary-engraving cutter. A period of cut-and-fit will be required, checking to see how smoothly the motor turns with the spur gear. Once the motor is positioned with a smooth operation running, affix it to the frame projection with epoxy. Do not use RTV. RTV puts off gases that eat up motor brushes when running.

Before starting, test the decoder to insure that it is functioning correctly and that the locomotive is broken in and running well. This is critical as we will be checking the operation several times during the decoder installation process.

- Cut the decoder yellow and green wires to Â½". These are not used in this conversion. Twist the wires that were cut together, and wrap a small piece of insulating tape over the ends so they cannot short against the metal weight that is in the tender.
- Remove the superstructure of the locomotive by removing the small Phillips screw (in the smokestack or in a steam dome), lifting the boiler upwards and sliding it to the rear. You cannot completely put the superstructure aside as the wires connecting the locomotive to the tender run through the opening at the cab end.
- Remove the tender shell by unhooking the small retaining plastic tabs on the bottom of the tender at each of the 4 corners. Do this carefully so you do not break the tabs or damage the frame or steps.
- Some tenders may be equipped with two projections, one at the front and rear of the tender, which penetrate the metal frame. Push inward on each projection to remove the shell.
- Loosen the Phillips screw at the rear of the gear cover on the bottom of the locomotive just enough to remove the 4-wheel trailing truck, then re-tighten the screw.
- Using a hobby knife and wire cutters, carefully cut each brush contact strip so the brushes are isolated from the locomotive frame, but leaving just enough of the contact strip for soldering of the decoder wires. You do not need to remove the motor to do this. Check with an ohmmeter to

ensure that there is no continuity between the motor brushes and the frame.

- ❑ The DZ-121 decoder will simply be inserted between the tender pickup contacts and the motor brushes, plus wires will be run to the locomotive frame for additional track pick up. Cut the wires in the tender to a length of 1" from where they pass through the weight. Strip 1/8" insulation from the ends of each wire in the tender (not the wires connected to the locomotive motor)

  Note that not all Con-Cor Hudsons have tender pickup contacts. A quick and simple, though not elegant, way of adding tender pickup is as follows:

  - o Use 36 AWG *stranded* wire about 6 inches long. Strip 3 inches of insulation from one end.
  - o Drill a 0.062" hole in the center of the tender metal chassis floor. This will be used to get the wires into the tender shell.
  - o Starting with the rear truck and starting just at the end of the insulation, wrap the stripped wire around the third axle from the rear, then wrap it around the second axle and finally the last axle. Be sure the wrapping is not so tight as to restrict turning of the axle, just tight enough to get good electrical contact. This will become part of the left rail power pickup.
  - o Repeat with a second 36 AWG wire for the front truck, which will become part of the right rail power pickup.
  - o Route both wires into the tender body through the hole drilled earlier. Be sure to leave enough slack so the trucks can pivot freely. Paint the visible wire insulation black, if you used wire with a different color.
- ❑ To insure optimal operation, provide connections from the locomotive pickup along with the tender pickup. Loosen the screws holding the frame together and separate the locomotive frame castings only enough to get a screwdriver blade between the castings and the fiber insulator. Use spare decoder wire (red for right side and black for left side) and strip the insulation ¼". Insert one wire on each side of the fiber insulator. Tighten the two screws holding the castings together. Route the wires along the top of the frame being careful to keep them away from the screw used to secure the locomotive shell to the frame.
- ❑ Cut the decoder red and black wires to 1" each, and strip 1/8" insulation from the ends.
- ❑ Connect the decoder red wire to the tender wire coming from the right side pickup (looking forward) and to the red wire coming back from the locomotive frame. Connect the decoder black wire to the tender wire coming from the left side pickup and to the black wire coming back from the locomotive frame. Solder and carefully insulate the connections with electrical tape or heat-shrink tubing. Be sure you pass the tender wires through the weight before making the connections.
- ❑ Position the decoder in the tender so the orange and gray wires extent out the front of the frame, then temporarily tape the decoder in place on the tender frame.
- ❑ Cut the orange and gray decoder wires to 2½", and strip ¼" insulation from the ends.
- ❑ Pass the decoder orange and gray wires through the opening in the rear of the locomotive cab. Solder the orange decoder wire to the bottom motor brush strip and the gray wire to the top motor brush strip, being careful no loose strands can short to the frame.
- ❑ This is the time install a headlight in the locomotive if you want. The headlight chosen is the Miniatronics 15.V, 0.015A, 1.2mm bulb.

  Drill a 1/8" hole through the headlight casting on the engine shell.

  Glue the headlight bulb in place with ACC

  The leads from the bulb do not allow for much bending near the back of the bulb, so some of the front of the engine frame must be removed. Do this carefully with a motor tool with a wide cutoff wheel. Open the space behind the headlight until the engine superstructure can be replaced properly on the frame without stressing the bulb leads.

  Carefully route the bulb leads along the engine frame and out the rear.

  Connect a 700-ohm ¼-watt resistor in series between one lead and the decoder blue wire, so that the resistor is located in the tender. Solder and insulate the connections.

  Connect the other headlight bulb lead to the decoder white wire. Solder and insulate the connection.
- ❑ Remove the tape temporarily holding the decoder in place. Dress all leads within the tender and locate the decoder in place in the tender. Place the tender shell on the frame, and snap into place.
- ❑ Replace the 4-wheel trailing truck. Place the engine superstructure loosely on top of the frame. Place the engine and tender on a test track and check for correct operation. Resolve any problems.
- ❑ Replace the engine superstructure on the frame and secure with the screw through the smokestack/steam dome.

- ❑ Perform a final test on the railroad to ensure proper operation.
- ❑ Place the locomotive on the DCC programming track and set the DCC Command Station to the programming mode.
- ❑ Program Configuration Variable "CV29" to "06" for 2-digit addressing or "26" for 4-digit addressing then program the decoder to the desired address.
- ❑ Carry out a final check of the locomotive on the railroad.
- ❑ Record the decoder CV's and address, and the reporting marks of the locomotive.

The conversion is complete. Enjoy your DCC-equipped locomotive.